



The effects of body-worn cameras (BWCs) on police and citizen outcomes: A state-of-the-art review

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Abstract

Purpose – The purpose of this study is to review the extant of the published literature on body-worn cameras (BWCs) in policing, specifically in the context of how BWCs effect both citizens and officers.

Design/methodology/approach – The current study is a narrative review of the impact of BWCs on police and citizens generated through a search of four repositories (Google Scholar, Criminal Justice Abstracts, EBSCO Host, PsychInfo).

Findings – The current narrative review identified 21 articles that matched the selection criteria. In general, this body of research demonstrates that: (a) the police are supportive of BWC adoption; (b) the evidence from BWC evaluations suggests that the use of BWCs can have benefits for police-public encounters.

Practical implications – The practical implications derived from this narrative review suggest to police administrators that the adoption and effective implementation of BWCs are one mechanism that can strengthen police-community relationships and decrease police misconduct through enhanced legitimacy and accountability.

Originality/value – This study is useful for researchers who wish to further examine BWC issues in policing, for police managers/administrators who are currently utilizing BWC technology, and for those who are considering adopting BWC technology.

Keywords: body-worn cameras; BWCs; police legitimacy; police accountability; police behavior

Introduction

In the wake of increased media attention surrounding several questionable interactions between police officers and citizens in recent years, policing has come under increased scrutiny from the public and the media. Some members of the public feel as though the police are rarely held to account for their actions, oftentimes because the only evidence is conflicting testimony from the citizen and the officer involved in the encounter. To enhance the legitimacy of the police, law enforcement agencies are increasingly implementing BWCs to provide video evidence of what transpired during police-citizen encounters. Theoretically, if officers and citizens know they are being recorded, BWCs should alter their behavior. Furthermore, the video footage can potentially provide objective evidence to substantiate the claims of citizens who accuse the police of wrongdoing and the claims of officers who are wrongfully accused.

While many of the most recent—and highly publicized—interactions between police and community members have occurred in the United States (e.g., Philandro Castile, Keith Scott, Sylville Smith), the use of BWCs as a policy solution is not limited to the United States. In fact, police forces in the United Kingdom, Australia, and Canada—among others—have all adopted BWC technology. Although a growing number of police forces are adopting BWCs, only a handful of peer-reviewed scientific studies have been published as of January 2017. And, although there is a relatively small number of studies that have been published on this topic, there are some consistent and interesting findings that have emerged from the BWC literature. The current study provides a narrative review of the effects of BWCs within policing, specifically examining the impact that BWCs have had on both officers and citizens.

Current Study

The purpose of this article is threefold. First, we review the extant BWC literature, and we focus on presenting the major findings and trends that have emerged from the research. Second, we discuss directions for future research and identify methodological issues that are still in need of being addressed. Third, we conclude by highlighting policy challenges that can be gleaned from these studies and that need to be addressed going forward.

Methods

English language publications were identified using a search of several academic databases (i.e., Criminal Justice Abstracts, EBSCO Host, PsychInfo, Google Scholar), and two search terms were utilized: “police body worn cameras” and “law enforcement body worn cameras.” The search yielded 52 non-duplicate entries, including research articles, legal reviews, editorials, news articles, policy documents, and methodological papers. After reading through titles, abstracts, and full-text documents, the search was narrowed to include only those publications that contained empirical assessments and/or evaluations of BWCs to examine the impact of the technology through specific research questions using experimental, quasi-experimental, and non-experimental research designs. This screening process generated 21 research articles that fulfilled our criteria. Table 1 presents summary information on the empirical studies contained within the 21 research articles.

Insert Table 1 about here

Results

The studies included in this review investigate the effects of BWCs on several *citizen-focused* outcomes: complaints, resistance to police, and perceptions of officer behavior. Other studies assessed the effects of BWCs on the perceptions and behaviors of *officers*: use-of-force, perceptions of BWC, and the impact of BWCs on decision-making in enforcement. We separate out the results related to citizens and to officers as we believe that separating the two groups of outcomes makes it easier to digest this body of literature.

BWCs Effects on Citizens

Although arguably a simplistic measure of BWC effectiveness, the first citizen dimension reviewed focuses on BWCs impact on citizen complaints. These events represent the sentiments of the community member who files the complaint (Lersch & Mieczkowski, 2000). In the first published randomized-controlled trial of body-worn cameras by Ariel, Farrar, and Sutherland (2015), the authors found no significant differences between treatment shifts and control shifts during the year that cameras were introduced. However, they did report a significant reduction (87% in overall complaints) when comparing the experimental year to the previous year. While surprising that no effect was seen between experimental and comparison groups, this has also been found in another study using different police agencies (Ariel et al., 2016a; 2016b). The authors attributed this lack of between-group difference to the large overall reduction in complaints before and after implementation, and to what they refer to as ‘contagious accountability’ (Ariel et al., 2016c). Specifically, they found that complaints against officers declined from 1.20 complaints to 0.08 complaints, on average, when comparing the pre-treatment and post-treatment complaint rates across the seven experimental sites, and many of these sites were large urban centers.

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3 These results, however, are not universal. A study from Orlando, Florida found that
4 BWCs reduced serious external complaints by 65% in the experimental group compared to a
5 control group (Jennings, Lynch, & Fridell, 2015). A similar finding was reported by Hedberg,
6 Katz, and Choate (2016) in Phoenix, Arizona, however in a non-randomized controlled trial.
7 Using a different sample and a different analytical technique, these authors showed that BWCs
8 significantly reduced citizen complaints by 62% when compared to a control group.
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11 A second group of studies examined the effects of BWCs on citizens' resistance to
12 officers. Recall that BWCs are meant to positively influence the behavior of citizens' as they
13 know the encounter is being recorded and can be used as evidence against them. However,
14 findings from this research calls into question the veracity of this proposition. For example,
15 research from Hedberg et al. (2016) from Arizona suggested that BWCs had no impact on citizen
16 suspect resistance. Moreover, Ariel et al. (2016a) demonstrated that reported rates of assaults
17 against officers were actually *higher* compared to controlled conditions when cameras were used
18 when averaged across the ten experiments in their study. On the other hand, Ariel et al (2017)
19 have shown that on a before-after basis, BWCs were linked to an overall reduction in assaults
20 against the police.
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23 Lastly, three studies reviewed here investigated how BWCs affect citizens' perceptions of
24 police behavior and how BWCs affect citizens' willingness to report crime. With regards to
25 police behavior, it is presumed that officer behavior should be perceived by the public as more
26 legitimate/lawful citizens know that officers are being recorded. This premise was partially
27 supported by Culhane et al. (2016). In their study, participants were asked to evaluate the
28 justifiability of the police shooting in which several conditions were manipulated, including the
29 presentation of the case information (BWC vs. audio vs. transcript). Their results demonstrated
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that, overall, 39% of the sample thought the shooting was justified; however, both the BWC and audio condition participants rated the shooting as more justified compared to the transcript condition. The researchers conducted this study again post-Ferguson. Interestingly, 39% of the post-Ferguson sample thought the shooting was justified, but, those in the BWC condition had the *lowest* certainty of justifiability. In addition, one year post-Ferguson, Culhane and Schweitzer (2017, *in press*) found that BWC and audio conditions saw the officer as being slightly more justified in the shooting compared to transcript condition { $M = -0.56$ and $M = -0.07$ compared to $M = -1.00$ respectively, with scores ranging from -5.00 (“completely unjustified”) to 5.00 (“completely justified”)}, but these differences were not statistically significant.

BWCs Effects on Officers

One of the fundamental justifications for BWC is that they will affect officers’ behavior as well as citizens’. BWCs are meant to *positively* influence the actions of officers, leading to greater legitimacy and lower misconduct (Ariel, 2016). Our review suggests that BWCs *can* influence officers in several ways, but the putative “positive” impact on officer behavior is not always substantiated. for example, Tankebe and Ariel (2016) have shown that police officers are rather cynical about the benefits of BWCs. In what follows, we look at officer attitudes, behavior and effects on procedural elements of law enforcement.

The first factor we review here is whether and how officers’ attitudes towards BWCs change after wearing the technology. Some police agencies and labor organizations have vehemently denied the benefits of, and seriously questioned the need for, BWCs (Conarck, 2017). This reticence is particularly important given the research suggesting the effectiveness of BWCs is directly related to the frequency with which the technology is activated (Hedberg et al., 2016; Young & Ready, 2016), and the degree to which the officers adhere to the protocol or

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3 apply discretion when turning on/off their camera. Nevertheless, Jennings et al. (2014) and
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5 Ready and Young (2016) both found that officers were generally very receptive of BWCs, and
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7 officers believed that the technology would be good to use to regulate officer behavior and
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9 improve police-community relations.
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13 Despite this evidence pointing toward generally positive officer perceptions of and
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15 receptiveness toward BWCs, other research suggests that BWCs can create a “perception bias”
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17 (Bolvin et al., 2017). For example, in a laboratory test with police recruits in Montreal, Canada
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19 were shown video footage of a fictional police shooting via either a BWC or a wall-mounted
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21 surveillance camera. The authors reported that the justifiability of the shooting was significantly
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23 affected by camera perspective. Here, police recruits who viewed the BWC perspective were
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25 *more* likely to report that the officer fired too early (Bolvin et al., 2017). Similarly, Smykla et al.
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27 (2016) found that respondents were reticent to adopt BWCs over a strong concern that the media
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29 might use BWC footage to persecute the police. Moreover, research from three western U.S.
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31 cities indicated higher perceptions of BWC use post-implementation but also became more
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33 skeptical about BWCs impact on citizen cooperation or officer professionalism (Gaub et al.,
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35 2016). While the reasons for these differences are unclear, an interesting explanation comes from
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37 Young and Ready (2015) who found that officers’ perceptions were strongly related to the
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39 attitudes of other officers in the same social network.¹
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51 ¹ It is possible that officers who view BWCs as illegitimate could contaminate the attitudes of their colleagues. This
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53 result should not be seen as entirely surprising given much of the work on organizational change in policing. The
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55 *Police Executive Research Forum* developed the “Good to Great Policing” system, which highlighted the need to get
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57 the right people in the right places to make organizational change more effective (Wexler, Wycoff, & Fischer,
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59 2007). This system argues that organizational change is most effective when administrators get respected people
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(i.e., those with dense networks within the agency) to advocate on behalf of the change and minimize the ability of
those who will never support the effort to influence others. Many police agencies are adopting BWCs and mandating
officers to use the technology without considering how the decision may be leveraged. The research seems to
suggest this may not be the best course of action.

A second line of research examines how BWCs change officers' behavior. Overall, the research clearly suggests that BWCs do alter officer behavior. For instance, research demonstrates that BWCs make officers less likely to use force (Ariel, et al., 2015; Ariel et al., 2016b; Henstock & Ariel, 2017), make officers more likely to make arrests in cases of intimate partner violence (Morrow et al., 2016), and make officers less likely to stop-and-frisk people on the street (Ready & Young, 2015). In addition, research from Jennings and colleagues (2015, 2016) found evidence to support the use of the technology as BWC officers had fewer response-to-resistance encounters compared to both pre-BWC implementation and to control officers during BWC implementation. However, the change in behavior stemming from BWCs is not always in the direction that some citizens would hope for. For example, Ready and Young (2015) found that BWC officers were more likely to initiate encounters with citizens and write citations. However, recent evidence from a global, multi-site study has provided robust evidence that use of force as it relates to the presence/absence of body-worn cameras varies by officer discretion for when to turn on/off the camera, and this is a critical point for implementation. Specifically, Ariel et al. (2016b) demonstrated that use of force significantly decreased when officers were in "high compliance" for when to turn the camera on/off during treatment and control shifts, increased when the officers applied discretion during the treatment shifts and adhered to protocol during the control shifts, and null effects were found when the officers applied full discretion during both treatment and control shifts.

Lastly, BWCs have been shown to affect the more technical/administrative aspects of an officer's job. Jennings et al. (2015) found that BWCs served to enhance report writing and the collection of evidence. Furthermore, better report writing and evidence collection on the part of the police can serve to aid local prosecutors. In fact, Morrow et al. (2016) found that cases of

intimate partner violence, in which the arresting officer(s) was wearing a BWC, were more likely to result in an arrest, charges filed, cases furthered by the district attorney's office, and to result in a conviction.

Methodological Challenges and Directions for Future Research

BWC scholarship is still rather nascent in its development, with the earliest study reviewed here published in 2014. Despite the developing nature, much of this research has been conducted using a robust methodology (i.e., randomized controlled trials), albeit with the trials themselves being implemented in different ways. Nevertheless, there are still several methodological challenges that need to be addressed in future research. We believe there are four key methodological challenges that need to be addressed to enhance our understanding of the effects (and potential benefits) of BWC technology.

The first challenge centers around the *effect size* that BWCs have on the outcome of interest. Studies that employ RCT designs purportedly have the highest level of internal validity (Weisburd, 2010), and the RCT research reviewed here generally demonstrates that BWCs had a significant effect on the outcome(s), although this effect can vary by officer discretion of when to turn the camera on/off (Ariel et al., 2016b). The need for additional effect sizes derived from RCTs (or from rigorous quasi-experimental designs) is especially important in the realm of BWCs because police agencies need to know their likely return on investment. While BWC technology itself is cheap, the storage of digital evidence is increasingly expensive (Ariel 2016b). Thus, police agencies may feel less trepidation in allocating portions of their budget to BWCs if they were able to see an estimate of return on investment. Evidence from this narrative

review suggests that perhaps BWC adoption and implementation could have several, tangible benefits (e.g., reduced citizen complaints, reduced police use of force, enhanced-quality police reports).

A second methodological challenge that should be addressed in future BWC research revolves around selection effects. As is the case for most criminological research, most of the current studies had implicit selection effects built into their methodology. The biggest selection effect present in the reviewed research centers on the fact that agencies choose to adopt BWCs for a variety of reasons (e.g., consent decree, desire, mandated by state law). Furthermore, agencies choose whether to participate in research studies and what type of research they are willing to participate in. While all of this is beyond the control of the researchers, it has strong implications for the results of the studies. It is likely that those agencies most willing to engage in BWC research, particularly a tightly-controlled RCT, are those that are least in need of the potential benefits of the BWC. This means the results of the current studies may actually be *underestimating* the effects of BWCs. Or, it is quite possible that the police departments that have implemented BWCs thus far in these evaluations reviewed here are implementing BWCs as best as they can, and these effect sizes are as “good as they are going to get”.

In addition, other selection effects include which officers volunteer to participate in a BWC trial program and which geographic areas (e.g., beats, districts) are chosen for BWCs. For example, the Ariel’s (2016a) study utilizes Denver’s District six, but media reports indicate the police department’s administration specifically chose this location due to a high volume of activity (Mitchell, 2014). This is crucial because the BWC treatment effect can potentially be affected when these types of decisions are made. Because these decisions are often made by the

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3 agencies rather than researchers, developing a true estimate of the treatment effect using
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5 *between*-groups designs are going to be impacted.
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8 A third methodological challenge stems from the realities of police work. During the
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10 more chaotic moments in policing, officers often end up working in different geographic areas
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12 and with officers with whom they may rarely—if ever—come into contact with. While this is not
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14 inherently problematic, this reality of police work can introduce confounding effects (i.e.,
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16 treatment contamination effects) into RCT designs. This is also referred to as *leakage* (Plewis &
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18 Hurry, 1998), *spillover effects* (Bloom, 2005), and *treatment diffusion* (Shadish, Cook, &
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20 Campbell, 2002). The premise is that officers in the control group are exposed to the treatment
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22 (here, the BWC), which then changes the behavior of the non-BWC officer. This again may
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24 cause the underestimating of the true effects of BWCs. Additionally, as Young and Ready (2015)
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26 note, officers' perceptions of the legitimacy of BWCs was affected by the attitudes of other
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28 officers with whom they interact—irrespective of treatment condition. In this same vein, Ariel et
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30 al. (2015) as well as Ariel et al (2016c) have provided a detailed discussion on the implications
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32 of the “stable-unit-treatment-value” (SUTVA) assumption, or situations that occur where there is
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34 some dependency between the units of analysis in the experiment. The implication of these
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36 possible SUTVA violations is that some studies using the RCT methodology may be
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38 inconsistently estimating the true effect of the BWC technology (Donner & Klar, 2000). Future
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40 research should continue to employ the best possible methodology and try to determine the true
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42 size of the treatment effect from repeated replications across agencies (e.g., Ariel et al., 2016a,
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44 2016b) or consider randomizing BWC and non-BWC shifts within officers (e.g., Ariel et al.,
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The final methodological challenge highlighted here concerns the intent-to-treat (ITT) problem. Per Fisher and colleagues (1990) suggest the ITT problem makes the tacit assumption that all participants were in perfect compliance with the treatment protocol and analyzes them as such. While this assumption likely holds in laboratory conditions with extreme levels of control, this assumption is tenuous at best in field experiments (Bollen, 1989). Despite the media identification of cases where BWCs were not activated by officers when they should have been, the issue of ITT is rarely addressed in the research. However, in the few studies to date that have accounted for this issue, the evidence suggests that treatment fidelity (i.e., officers activating their BWC every time they are meant to) is inextricably linked to the success of BWCs (Ariel et al., 2016b; Hedberg, Katz, & Choate, *in press*). Future research should devote greater attention to the implementation issues, treatment fidelity, and implications for a study's results and policy recommendations.

Policy Implications and Considerations

In addition to methodological challenges for researchers, there are also a number of policy-related issues that need to be considered by police administrators. Given the emerging nature of the technology, guidelines and policies for effective use are still being developed and refined. We highlight three specific policy challenges that police agencies will need to address with the technology.

First, it is incumbent upon police agencies to determine when officers should activate BWCs. The research here suggests that BWCs can have a significant impact on a variety of outcomes, but much of the success of BWCs (at least in reducing use of force) preliminarily seems to be linked to appropriate activation and adherence to when to turn the camera on/off (Ariel et al., 2016b; Hedberg, Katz, & Choate, *in press*). While a full explanation of how BWCs

are meant to impact police-citizen interactions is beyond the scope of this study (but, see generally Ariel, 2016c), the effectiveness of BWCs is contingent upon multiple factors. The activation of BWCs, however, is an issue that is not as clear-cut as many would think. This decision should be guided by policy and deliberately crafted to weigh potential privacy concerns of both citizens and officers. In Denver, for example, the initial policy was updated—based on feedback from various stakeholders—to restrict the use of cameras in places where people have a reasonable expectation of privacy that would be directly compromised by BWCs (e.g., restrooms, medical facilities, locker rooms; Arellano, 2015). The spirit of these policies is that BWCs should serve as a tool to improve legitimacy, accountability, and police-citizen interactions, rather than to embarrass or needlessly collect personal information. There are also some states (e.g., Illinois) that have strict laws on eavesdropping, which could force officers to turn off BWCs and, as such, defeat the overarching purpose of the technology (Veritatis Institute, 2016). Despite the difficulty in balancing privacy and accountability, the American Civil Liberties Union (ACLU) has released a white paper outlining what the organization considers as best practices for the fair and effective implementation of BWCs (ACLU, 2017; see also Ariel 2016d).

Second, agencies need to identify an effective way to review the BWC footage. The volume of information collected by officers wearing BWCs is enormous. Research by Lane (2006) suggests that while the span of control (i.e., how many subordinates are supervised by a single supervisor) is relatively small (i.e., between 5 and 12) in most police departments in the United States, this still creates a great deal of BWC footage to be reviewed by a supervisor. Using the lower-bound estimate of 5 officers working an 8-hour shift, every officer wearing a BWC could produce more hours of video than could be reviewed by a supervisor in a work

week. On the other extreme, simply reviewing those instances in which a citizen files a complaint may be equally as problematic. Evidence suggests that only about one-third of people who feel they have been mistreated by the police file a formal complaint (Walker & Bumphus, 1992). Therefore, supervisors would have diminished opportunities to hold problem-officers accountable. This infrequent reporting may be being driven—at least in part—by the fact that only ten percent of misconduct cases brought against officers are eventually substantiated (e.g., Pate & Fridell, 1993). However, there is a distinct possibility that BWCs could change this calculus and increase reporting rates because there is now objective video evidence of what happened during the interaction. Recognizing this as an issue, the International Association of Chiefs of Police (IACP) recommends that footage from a random sample of officers' BWCs be reviewed on a regular basis (IACP, 2014). Or, better yet, for supervisors to (randomly) review footage that has been tagged for evidence and examine the frequency of officers tagging BWC video for evidence versus not. There may be concerns with such a policy, as the 'rank and file' could object to this practice, as it may reduce their motivation (see Ariel 2016c), so more research is required to capture the 'best practice' approach on auditing and supervisory role in the use of BWCs

Finally, for BWC technology to maximize its effectiveness, it is necessary to consider how BWC footage will be utilized. If the goal of BWCs is simply to locate officers who violate department policy and/or the law and then hold them accountable, then the true effectiveness of BWCs will never be realized. Some officers, although certainly not all (see Jennings et al., 2014), may be reticent to adopt BWC technology for fear that it will be used as a new tool of what some officers perceive as an erratic and punishment-centered police administration (Paoline, 2001). While officers who do engage in misconduct must certainly be held to account,

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3 failing to recognize the potential value of BWC footage as a training tool is a missed
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5 opportunity. BWC footage provides a treasure-trove of data for real-time, non-punitive training
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7 sessions designed to build and refine officer competence and tactics. Data from other applied
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9 settings consistently suggests this type of non-punitive feedback can substantially improve
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11 performance and reduce deleterious behaviors (e.g., Theeboom, Beersma, & van Vianen, 2014).
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13 These data could be used for individualized coaching, roll-call trainings, or more comprehensive
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15 departmental training initiatives. Furthermore, agencies need not exclusively use BWC footage
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17 depicting areas in need of improvement, but could also use footage to model expectations and/or
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19 appropriate responses.
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24 **Conclusion**

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27 The overarching hope of police executives is that BWCs will serve to improve police-
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29 community relations by enhancing the legitimacy of the police. This enhancement will likely
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31 come when the public trusts that officers who violate the law and/or departmental policy will be
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33 held accountable for their actions. The implementation of BWCs help to serve this purpose. In
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35 this study, reviewed the extant scientific literature regarding BWCs in policing following a
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37 systematic search. The evidence seems to suggest that the police are generally receptive to BWC
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39 adoption, and that BWCs can exert positive effects on both citizen and police behavior. Going
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41 forward, researchers should continue to investigate the costs, efficiency, and effectiveness of
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43 BWC technology as there are 1) still a number of unanswered questions in need of empirical
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45 investigation, 2) several methodological challenges to overcome in BWC research, and 3) policy
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47 issues that need to be more carefully considered by police administrators to get the most out of
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49 BWC implementation.
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Table 1. Summary of Studies Included in Narrative Review

Author(s)	Study Design	Location	Statistical procedure	Outcome(s)	Summary of findings
Ariel (2016)	Stratified sample of 27,003 street segments within six patrol districts	Denver, CO	One-way and repeated measure ANOVAs	Crime reporting (911 calls for service)	BWCs on officers in low crime density street segments increased willingness to report crimes to the police, but had no effect on crime Reporting in hotspot street segments
Ariel, Farrar, & Sutherland (2015)	Complete population of frontline officers (n = 54) assigned to 489 treatment shifts and 499 control shifts over a 12-month period	Rialto, CA	Poisson regression models and time-series ARIMA models	Officer use of force and citizen complaints	<i>Use of force</i> : force incidents were twice as likely to occur in control group during experimental period. <i>Citizen complaints</i> : No significant differences between treatment shifts and control shifts; however, there was a significant reduction (87% in overall complaints) during experimental period compared to previous year.
Ariel et al. (2016)	2,122 officers assigned to 2,218 treatment shifts and 2,468 control shifts	2,122 officers across 8 European police departments; a total of 10 randomized controlled trials	Meta analysis; Cohen's <i>d</i>	Officer use of force; sub-group analysis based on compliance with the experimental protocol	Use of force rates were significantly lower (37%) when the officers complied with the treatment protocol; use of force rates were 71% higher when officers did not comply with the treatment protocol (i.e., the officers chose when to turn the body-worn cameras on/off); and null effects were reported when there was an overall breakdown in protocol (i.e., full discretion).
Ariel et al. (2016a)	2,122 officers assigned to 2,218 treatment shifts and 2,468 control	2,122 officers across 8 European police departments; a	Meta analysis; Cohen's <i>d</i>	Officer use of force and assaults against officers	<i>Use of force</i> : BWCs had no significant effect on average. There results were heterogenous, however. There was a 55% difference in the prevalence of

	shifts	total of 10 randomized controlled trials			use of force between treatment and control shifts in 3 sites, and negative findings at most sites (i.e., use of force <i>increased</i> at most sites). <i>Assaults against officers</i> : officers wearing BWCs were more likely to be assaulted compared to the control group. Significant heterogeneity was reported. The rate of assaults against officers per 1,000 arrests was 14% higher during the shifts where the cameras were present. Or in other words, there were 25 officers assaulted in treatment shifts compared to 22 officers assaulted in control shifts (per 1,000 arrests).
Ariel et al. (2016b)	1,847 officers assigned to 1,908 treatment shifts and 1,974 control shifts	1,847 officers across 7 global police departments; a total of 7 randomized controlled trials	Meta analysis; Cohen's <i>d</i>	Citizen complaints	No significant differences between treatment shifts and control shifts; however, there was a significant reduction (93%) in overall complaints during experimental period compared to previous year. Specifically, complaints dropped from an average of 1.20 to 0.08 complaints per officer when comparing pre-treatment and post-treatment complaints. Significant heterogeneity was not detected between the sites.
Bolvin et al. (2017, <i>in press</i>)	231 college students from the University of Montreal; 202 police recruits at	Montreal, Quebec, Canada	Chi-square	Citizen and police recruit perception of police shooting justifiability	Evidence of a BWC perspective bias, but bias not generalized. University students (little to no experience of police work) were not significantly affected by the camera perspective.

	<p>the Quebec Police Academy</p> <p>Participants randomly shown one of two videos of a fictional police shooting; one was been filmed with BWC and other with a wall-mounted surveillance camera.</p>				<p>Police recruits, however, were significantly affected by camera perspective. The more one is trained to evaluate police interventions, the greater the effect of camera perspective. Interestingly, police recruits who viewed BWC perspective were <i>more</i> likely to report that officer fired too early.</p>
<p>Culhane, Boman, & Schweitzer (2016)</p>	<p>Study 1: Pre-Ferguson (n = 404 U.S. citizens)</p> <p>Study 2: Post-Ferguson (n = 432 U.S. citizens)</p> <p>Participants learned information of police shooting in which several conditions were manipulated, including presentation of information (BWC vs. audio vs. transcript)</p>	<p>United States; data collected through Amazon's mTurk website</p>	<p>ANOVA, correlation, and OLS regression analyses</p>	<p>Citizen perception of police shooting justifiability</p>	<p>Study 1: 39% of sample thought shooting was justified, but those in BWC or audio conditions felt it was more justified than transcript condition.</p> <p>Study 2: 39% of sample also thought shooting was justified, but, post-Ferguson, those in BWC condition had lowest certainty of justifiability</p> <p>In both studies, majority of participants still thought police should use BWCs</p>

Culhane & Schweitzer (2017, <i>in press</i>)	215 U.S. citizens Participants learned information of police shooting in which several conditions were manipulated, including presentation of information (BWC vs. audio vs. transcript)	United States; data collected through Amazon's mTurk website A partial replication of the above study; one-year post-Ferguson	ANOVA	Police shooting justifiability	Overall, 43% of sample thought shooting was justified. BWC and audio conditions saw officer as being slightly more justified shooting compared to transcript condition, but differences not significant. The mean justification score of BWC condition was significantly higher than the post-Ferguson score (Study 2 data above) and not significantly different from pre-Ferguson mean (Study 1 data above). Findings suggest that public's perception of the justifiability of officer shooting returned to levels seen before national media coverage of Ferguson.
Gaub et al. (2016, <i>in press</i>)	Pre-deployment and post-deployment surveys of officers randomly assigned to treatment (BWC) or control groups in three U.S. cities	Spokane, WA (treatment, n = 80; control n = 73) Tempe, AZ (treatment, n = 102; control n = 103) Phoenix, AZ (treatment, n = 56; control n = 50)	Descriptive analyses	Officer perceptions regarding the use of BWCs	Phoenix officers had lowest perceptions of BWCs both pre- and post-deployment. From pre- to post-deployment, all three departments reported improved perceptions of the use of BWCs (e.g., improve quality of evidence), but became more skeptical about BWCs impact on citizen behavior (e.g., cooperation) or officer behavior (e.g., professionalism, integrity).

					However, post-deployment, Tempe and Spokane still recognized more positive effects of BWCs than did Phoenix.
Hedberg, Katz, & Choate (2016, <i>in press</i>)	All officers in Precinct Area 82 wore BWC (treatment). All officers in Precinct Area 81 (control) did not.	Phoenix, AZ Each Precinct Area generally had between 110–110 patrol officers during study period.	Linear and generalized linear regression analyses	Citizen complaints, arrests, and citizen resistance if arrest is being made	BWCs had a significantly reduced citizen complaints (by 62% compared to control group), but did not have an impact on arrests or suspect resistance.
Henstock & Ariel (2017, <i>in press</i>)	46 officers were randomly assigned on a weekly basis into 128 treatment shifts and 140 control shifts	Birmingham South Local Policing Unit in the West Midlands Police force area; United Kingdom	Odds ratios	Use of force during arrests	<p>Odds of force used when BWCs are present are, overall, 50% lower when compared with control conditions.</p> <p>Estimates suggest a 35% reduction of overall weighted force in the treatment conditions compared with control conditions. However, effect concentrates in open-hand tactics (physical restraints, non-compliant handcuffing); BWCs had no effect on more aggressive force responses (dogs, Tasers, batons, pepper spray).</p>
Jennings, Fridell, & Lynch (2014)	Survey data on 95 patrol officers	Orlando, FL	Descriptive analyses, means-difference tests, and correlations	Officer perceptions regarding the use of BWCs	Officers generally agreed that: (1) their agency should fully implement BWCs; (2) BWCs would improve citizen behavior; (3) BWCs would not reduce their willingness nor their fellow officers' willingness to respond to calls for service; (4) BWCs would

					improve the behavior of their fellow officers, but not necessarily their own behavior; and (5) BWCs would reduce their and their fellow officers' number of external and internal complaints.
Jennings, Lynch, & Fridell (2015)	Patrol officers randomly assigned to treatment (n = 46) and control (n = 43) groups Survey and official data collected	Orlando, FL	T-tests	Officer response-to-resistance, serious external complaints, and officer perceptions of BWC effectiveness	BWCs reduced response-to-resistance incidents by 53% and reduced serious external complaints by 65%. Survey data indicated that BWCs improved evidence collection and report writing, and that future police-citizen interactions could be improved if officer had a chance to watch video of his/her previous interactions.
Jennings et al. (2016, <i>in press</i>)	Using propensity score matching, 60 patrol officers receiving BWCs were matched to a statistically comparable sample of 60 non-BWC officers. Data were collected both in the 12 months post-BWC implementation and in the 12 months	Tampa, FL	Propensity score matching; t-tests	Officer response-to-resistance	BWC officers involved in significantly fewer number of response-to-resistance incidents post-BWC implementation. BWC officers' mean frequency of response-to-resistance decreased by 8.4% from the 12 months pre-BWC implementation to the 12 months post-BWC implementation compared with a 3.4% increase observed for the non-BWC officers.

	prior to BWC-implementation.				
Morrow, Katz, & Choate (2016, <i>in press</i>)	All officers in Precinct Area 82 wore BWC (treatment). All officers in Precinct Area 81 (control) did not.	Phoenix, AZ Each Precinct Area generally had between 110–110 patrol officers during study period.	Means-difference tests	Intimate partner violence (IPV) arrest, prosecution, and conviction	Compared with non-BWC cases, BWC cases were significantly more likely to result in an arrest, have charges filed, have cases furthered, result in a guilty plea, and result in a guilty verdict at trial.
Nowacki & Willits (2017, <i>in press</i>)	2013 LEMAS data; 823 police agencies across 48 states	United States	Logistic regression	Agency utilization of BWCs	Agencies with larger budgets and that are unionized are <i>less</i> likely to adopt BWC technology. Agencies that already use other forms of technology and that have adopted vehicle cameras are <i>more</i> likely to adopt BWC technology.
Pelfrey & Keener (2016)	Survey and interview data of 72 front-line and supervisory campus patrol personnel	An urban university in the U.S.	Descriptive, linear regression, and qualitative analyses	Perceptions of: officer behavior, complaints, BWC effectiveness, and agency adoption	Most respondents felt BWCs would improve quality of evidence and ease prosecution of offenders. Officers generally felt: BWC advantages outweighed BWC disadvantages; BWCs should be adopted by the agency; BWC data would help disprove citizen complaints; BWCs would have little impact on their own behavior or on how other officers interact with citizens; BWCs would not influence citizen behavior; and BWCs would not improve officer safety.

					Supervisors, generally, were more enthusiastic about BWC adoption and had more positive expectations of BWC effectiveness than patrol officers.
Ready & Young (2015)	100 patrol officers assigned to treatment (n = 50) and control (n = 50) groups in a quasi-experimental design. Data based on field contact reports completed by the officers following a police-citizen encounter.	Mesa, AZ During first 5 months of implementation, officers were <i>mandated</i> by policy to activate BWC when responding to a call or having any contact with the public. BWC policy was changed to <i>discretionary</i> activation during the last 5 months of evaluation.	Hierarchical generalized linear modeling	Officer behavior and helpfulness of BWCs	BWC officers were more likely to issue citations, initiate encounters; they are less likely to perform a stop-and-frisk or make an arrest. BWC officers more likely to report that cameras are a helpful tool in police-citizen encounters.
Smykla et al. (2016)	Survey data of 24 command-level police personnel	A southern U.S. county	Descriptive analyses	Perceptions of BWCs	The majority of respondents were in favor of BWC use, but did not strongly think that BWCs would impact officer effectiveness. They did generally feel BWCs would impact evidentiary issues (evidence collection and guilty pleas).

					<p>Most respondents thought BWCs would impact officer use of force, there was also concern that it would affect officers' ability to use necessary force.</p> <p>Respondents expressed strong concern that the media would use BWC footage to persecute the police.</p>
Young & Ready (2015)	<p>100 patrol officers assigned to treatment (n = 50) and control (n = 50) groups in a quasi-experimental design.</p> <p>Data based on officer surveys, a created shared-incident network, and field contact reports completed by the officers following a police-citizen encounter.</p>	<p>A southwestern U.S. police department</p> <p>During first 5 months of implementation, officers were <i>mandated</i> by policy to activate BWC when responding to a call or having any contact with the public. BWC policy was changed to <i>discretionary</i> activation during the last 5 months of evaluation.</p>	<p>Descriptive analyses, network autocorrelation models,</p>	<p>BWC legitimacy</p>	<p>Exposure to BWC use did not impact officer perceptions of camera legitimacy.</p> <p>However, an officer's framing of BWCs as legitimate is influenced by the ways in which other officers in their incident network also frame cameras. Attitudes about the benefits and legitimacy of BWCs are impacted by participating in shared events with other officers who are equipped BWCs.</p>
Young & Ready (2016, <i>in</i>	<p>100 patrol officers assigned to treatment (n =</p>	<p>A southwestern U.S. police department</p>	<p>Hierarchical generalized linear</p>	<p>Officer-initiated BWC activation</p>	<p>BWC activation significantly more prevalent under a mandatory-activation policy compared to a</p>

press)	50) and control (n = 50) groups in a quasi-experimental design. Data based on field contact reports completed by the officers following a police-citizen encounter.	During first 5 months of implementation, officers were <i>mandated</i> by policy to activate BWC when responding to a call or having any contact with the public. BWC policy was changed to <i>discretionary</i> activation during the last 5 months of evaluation.	modeling		discretionary-activation policy. While BWC activation declined during discretionary-activation period, this was less prevalent among officers who volunteered to wear BWC for study compared to those officers who were assigned to wear BWC for study.
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